

Fact Sheet for State Waste Discharge Permit No. ST0501318

GWI Holdings, Inc. / GACO Western

Date of Public Notice of Draft: February 9, 2021

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed State Waste Discharge Permit for GACO Western that will allow discharge of contaminated groundwater to ground for treatment by specially selected plants.

State law requires any industrial facility to obtain a permit before discharging waste or chemicals to waters of the state, which includes groundwater.

Ecology made the draft permit and fact sheet available for public review and comment for thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for GACO Western, State Waste Discharge Permit No. ST0501318, were available for public review and comment from February 9, 2021 until the close of business on March 11, 2021. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

GWI Holdings, Inc. / GACO Western reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions about the facility's location, history, product type or production rate, discharges or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closed, Ecology will summarize substantive comments and our responses to them. Ecology includes our summary and responses to comments to this fact sheet as **Appendix E - Response to Comments**, and it is published with the final State Waste Discharge Permit. Ecology generally will not revise the rest of the fact sheet. The full document will become part of the legal history contained in the facility's permit file.

Summary

This state waste discharge permit authorizes the discharge of contaminated groundwater to ground for treatment under conditions specified in the permit. Based on previous results from pilot testing Phytoremediation Attached Growth Reactors (PhAGRs – selected trees placed in various containment vessels containing combinations of soil and Perlite), this project will treat groundwater containing low levels of volatile organic compounds. The pilot test showed substantial decreases in contaminant concentrations. Contaminated groundwater is pumped to a holding tank that supplies a drip irrigation system applying this groundwater to a 6,750 square foot grove of poplar and willow trees called an EBuffer (US patent #5,947,041 and #6,250,237). These trees are selected for their specific remediation characteristics. The trees use the contaminated water for growth, and the pollutants are reduced in the root zone to nearly undetectable amounts. Groundwater in the surficial aquifer is monitored up gradient, in the EBuffer, and down gradient to ensure pollutants do not exceed levels set in the permit. Soil moisture, pH, and other factors will be measured pursuant to permit requirements.

Table of Contents

Purpose of this fact sheet	1
Summary	1
Introduction	4
Background Information	5
A. Facility description	7
History.....	7
Wastewater treatment processes (prior to land treatment)	7
Land treatment and distribution system	7
Solid wastes	8
B. Description of the groundwater	8
C. Wastewater characterization.....	8
D. State environmental policy act (SEPA) compliance	9
Proposed Permit Limits	9
A. Technology-based effluent limits	10
Wastewater treatment (prior to land treatment) requirements	10
Land treatment requirements	10
B. Groundwater quality-based effluent limits	11
Antidegradation policy	11
Antidegradation	11
Non-degradation	12
Background water quality.....	12
Monitoring Requirements	14
A. Lab accreditation	14
B. Wastewater monitoring	14
C. Groundwater monitoring	15
D. Vadose zone monitoring	15
E. Effluent limits which are near detection or quantitation levels.....	15
Other Permit Conditions	15
A. Reporting and record keeping.....	15

B.	Operations and maintenance	16
C.	Non-routine and unanticipated wastewater	16
D.	Industrial storm water discharge	16
E.	Best management practices – land treatment site	17
F.	General conditions	17
	Permit Issuance Procedures	18
A.	Permit modifications.....	18
B.	Proposed permit issuance	18
	References for Text and Appendices	19
	Appendix A--Public Involvement Information.....	20
	Appendix B--Your Right to Appeal.....	21
	Appendix C--Glossary	22
	Appendix D--Technical Calculations.....	26
	Appendix E--Response to Comments	30

List of Tables

Table 1.	General Facility Information.....	5
Table 2.	Wastewater Characterization	9
Table 3.	Groundwater Quality Criteria	12
Table 4.	Groundwater Quality-Based Early Warning Values.....	14
Table D-5.	MW-9 sample events.....	26
Table D-6.	Descriptive Statistics for MW-9 (Source Groundwater).....	28
Table D-7.	Most Conservative Risk Values	29

List of Figures

Figure 1	Facility Location Map	6
Figure 2	Facility Map	6

Introduction

The Legislature defined Ecology's authority and obligations for the wastewater discharge permit program in the Water Pollution Control law, chapter 90.48 RCW (Revised Code of Washington).

Ecology adopted rules describing how it exercises its authority:

- State waste discharge program (chapter 173-216 WAC).
- Water quality standards for ground waters of the state of Washington (chapter 173-200 WAC).
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC).

These rules require any industrial facility owner/operator to obtain a State Waste Discharge Permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for performance requirements imposed by the permit.

Under the State Waste Discharge Permit Program and in response to a complete and accepted permit application, Ecology generally prepares a draft permit and accompanying fact sheet, and makes it available for public review before final issuance. If the volume of the discharge has not changed or if the characteristics of the discharge have not changed, Ecology may choose not to issue a public notice. When Ecology publishes an announcement (public notice), it tells people where they can read the draft permit, and where to send their comments, during a period of thirty (30) days. (See **Appendix A – Public Involvement Information** for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft State Waste Discharge Permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in **Appendix E**.

Background Information

Table 1. General Facility Information

Facility Information	
Applicant	GWI Holdings, Inc.
Facility Name and Address	GACO Western 18700 Southcenter Parkway Tukwila, WA 98188
Contact at Facility	Name: Brad Helland Telephone #: 206-372-6806
Responsible Official	Name: E. Bryant Hill Title: VP Business Management Address: 1000 First Ave, Suite 2201 Telephone #: 206-910-8240
Industry Type	Independent clean-up action at an active dry goods warehouse
Cleanup Site Details	Site ID 2979 at Cleanup information
Type of Treatment	Phytoremediation (EBuffer, US Patent #5,947,041 and #6,250,237)
SIC Codes	4225
NAICS Codes	493110, 562910
Facility Location	Latitude: 47.434575 Longitude: -122.2631667
Legal Description of Application Area	Section, township, range SE ¼, SW ¼, Sec 35, T32N, R4E Latitude: 47.434901 Longitude: -122.263069
Groundwater Monitoring Well Information	
GWI_MW1 Westernmost MW	Ecology tag #: BLT941 Latitude: 47.43495315 (NAD83) Longitude: -122.26348285
GWI_MW2 Central MW	Ecology tag #: BLT942 Latitude: 47.43486775 (NAD83) Longitude: -122.26301155
GWI_MW3 Easternmost MW	Ecology tag #: BLT943 Latitude: 47.43470336 (NAD83) Longitude: -122.26246584
Permit Status	
Issuance Date of Permit	May 1, 2021
Date of Ecology Acceptance of Application	September 25, 2018
Permit fee category	Hazardous Waste – Leaking Underground Storage Tank

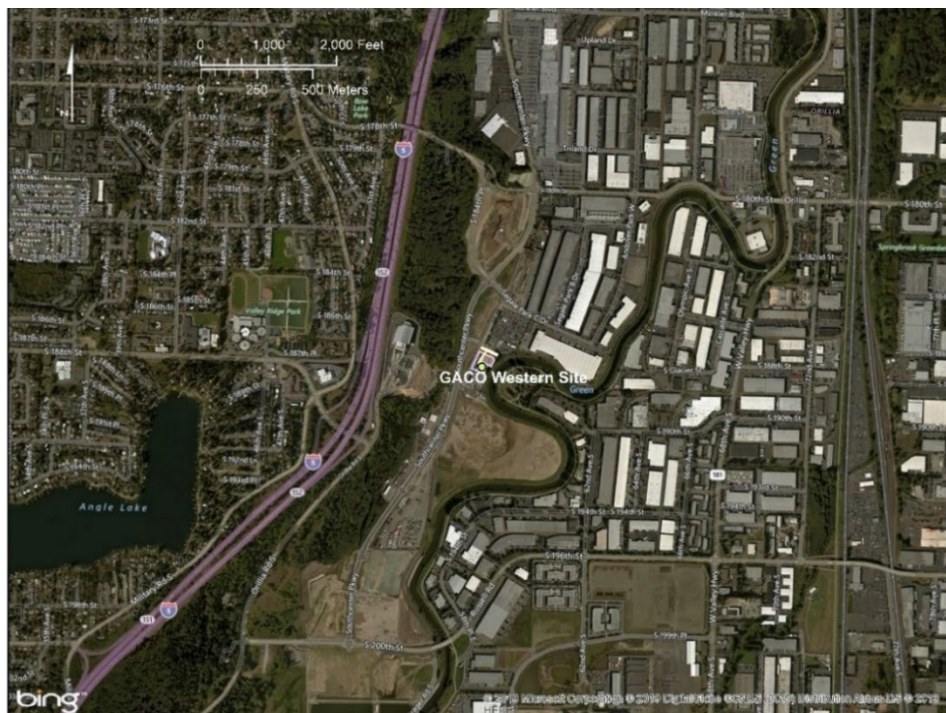


Figure 1 Facility Location Map



Figure 2 Facility Map

A. Facility description

History

This facility was a clean-up site in Ecology's Voluntary Cleanup Program (VCP) under the oversight of the Toxics Cleanup Program (TCP), but was later removed. The NW Region TCP responded to the VCP re-application finding the site was too complex for VCP and the application was rejected. Previous TCP investigations can be found here: [Toxics Clean-up Program Site Information](#). The site is currently undergoing an independent cleanup action. Currently there are no industrial processes at the site. The site buildings function as general warehousing and storage with some office space (under renovation).

This permit authorizes discharges to ground after treating contaminated groundwater on-site by phytoremediation using a mix of poplar and willow species (EBuffer, US Patent #5,947,041 and #6,250,237) to remove volatile organic compounds related to historic releases at the site.

The land treatment area is a small swath of trees specially selected to treat contaminated groundwater. Untreated contaminated groundwater will be distributed by drip irrigation. The operation was already used for the discharge of treated groundwater under a pilot program.

Wastewater treatment processes (prior to land treatment)

The discharge applies contaminated groundwater to the installed EBuffer plot of trees. The treatment process reduces volatile organics in the groundwater through degradation of chemicals in the soil and root zone of the trees.

Land treatment and distribution system

During the pilot test, effluent from the Phytoremediation Attached Growth Reactors (PhAGRs) was irrigated over 0.15 acres of trees planted for the purpose of phytoremediation. This provided information about treatment rates and other elements of the remediation system and additional treatment of groundwater during the pilot test.

After successful completion of the pilot test, the untreated groundwater will be discharged directly to the EBuffer. The EBuffer trees are planted at the north end of a parking area on property owned by the Permittee.

Soil in which the EBuffer trees are planted is a specially prepared mixture to enhance pollutant retention and uptake. The system will operate approximately nine months of the year (March through October). It is anticipated that treated discharge will percolate below the root zone to the upper aquifer. Because of the narrow nature of the treatment area, which is surrounded by impervious surfaces, saturation by precipitation is not considered a major concern. Nevertheless, soil moisture will be monitored periodically.

If treated or untreated groundwater becomes insufficient to sustain the trees, supplemental non-potable water is available from hose connections at the warehouse.

Solid wastes

This discharge is not likely to generate any significant solid waste. EBuffer trees that die will be removed and replaced with new trees, as necessary. If needed, proper disposal of the removed trees and soil will be made at that time. When trees are trimmed, the trimmings will be chipped and distributed inside the EBuffer to provide additional carbon, reduce weed germination, and retain water.

B. Description of the groundwater

Groundwater being treated by the system is contaminated with low levels of volatile organic compounds. These contaminants are related to historical releases at the site.

Permit writers in some cases must decide if the discharge of a pollutant onto the ground near a surface water is subject to an National Pollutant Discharge Elimination System (NPDES) Permit or State Waste Discharge Permit. Ecology believes the best guidance on this issue comes from the United States District Court Eastern District of Washington (Washington Wilderness Coalition v. Hecla Mining, 870 F. Supp 983, 990). The court held that since the goal of the Clean Water Act (CWA) is to protect the quality of surface waters, any pollutant, which enters such waters, whether directly or through groundwater, is subject to regulation by NPDES permit. The court went on to hold, "It is not sufficient to allege groundwater pollution, and then to assert a general hydrological connection between all waters. Rather, pollutants must be traced from their source to surface waters, in order to come within the purview of the CWA."

The decision on hydraulic continuity depends upon the:

- Pollutant (type and mobility in soils)
- Pollutant loading
- Soils at the site
- Hydrology of the site

Ecology has determined that it should issue a State Waste Discharge Permit and not an NPDES Permit for this site because the discharge is small in comparison to the local groundwater. Although the site is within 100 meters of a dike containing the Green River, this system is specifically designed for pollutant uptake. It is therefore very unlikely that any contaminants from this discharge would be uniquely distinguishable from similar contaminants in the area.

C. Wastewater characterization

GWI Holdings, Inc. / GACO Western reported the concentration of pollutants in the PhAGR pilot test discharge in the permit application. The tabulated data represents the quality of the wastewater discharged during pilot testing through December 2018. The wastewater after treatment is characterized as follows:

Table 2. Wastewater Characterization

Parameter	Units	# of Samples	Average Value ^a	Maximum Value ^a
1,1,2,2-Tetrachloroethane	µg/L	9	0.218	< 1 ^b
1,1-Dichloroethene	µg/L	9	0.653	3
1,2-Dichloroethane	µg/L	9	0.26	< 1
Acrylonitrile	µg/L	9	1.21	< 5
Benzene	µg/L	9	44.19	90.4
cis-1,2-Dichloroethene	µg/L	9	0.543	2.48
Ethylbenzene	µg/L	9	35.45	156
Ethylene Dibromide	µg/L	9	0.209	< 1
m-Xylene	µg/L	9	172.72	543
o-Xylene	µg/L	9	27.01	88.3
Tetrachloroethene	µg/L	9	0.214	< 1
Toluene	µg/L	9	5.88	17.6
trans-1,2-Dichloroethene	µg/L	9	0.217	< 1
Trichloroethene	µg/L	9	0.218	< 1
Vinyl Chloride	µg/L	9	1.07	4.02
a	All values are in micrograms per liter (µg/L).			
b	"<" symbol = less than the listed value.			

D. State environmental policy act (SEPA) compliance

State law exempts the issuance, reissuance or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than federal and state rules and regulations (RCW 43.21C.0383). The exemption applies only to existing discharges, not to new discharges.

To meet the intent of SEPA, new discharges must undergo SEPA review during the permitting process. The facility filed a SEPA checklist with Ecology on November 17, 2020, and Ecology issued a determination of non-significance for the project on February 9, 2021.

Proposed Permit Limits

State regulations require that Ecology base limits in a State Waste Discharge Permit on the:

- Technology and treatment methods available to treat specific pollutants (technology-based). Dischargers must treat wastewater using all known, available, reasonable methods of prevention, control, and treatment (AKART). Ecology has developed guidance describing technology-based (AKART) criteria for industrial/commercial systems that discharge to ground; (Ecology, 1993; 2004).
- Operations and best management practices necessary to meet applicable water quality standards to preserve or protect existing and future beneficial uses of the groundwater.
- Groundwater quality standards (WAC 173-200).
- Applicable requirements of other local, state and federal laws.

Ecology applies the most stringent of technology and water quality-based limits to each parameter of concern and further describes the proposed limits below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, monitoring, and irrigation/crop management). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, and are not listed in regulation.

Ecology does not usually develop permit limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize the discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent. Until Ecology modifies the permit to reflect additional discharges of pollutants, a permitted facility could be violating its permit.

A. Technology-based effluent limits

Waste discharge permits issued by Ecology specify conditions requiring the facility to use AKART before discharging to waters of the state (RCW 90.48).

Ecology determined that the facility meets the minimum requirements demonstrating compliance with the AKART standard if the GWI Holdings, Inc. / GACO Western operates the treatment and disposal system as described in the permit application.

Ecology also evaluated the report for water quality-based requirements, which is described in the next section of the fact sheet.

Wastewater treatment (prior to land treatment) requirements

Neither industrial category assigned to this site has technology-based water quality limits. Therefore, any limits derived will be based solely on the goal of meeting groundwater quality standards.

Land treatment requirements

GWI Holdings, Inc. / GACO Western must meet the following permit limits to satisfy the requirements for AKART:

- Application of wastewater via drip irrigation must not exceed soil field capacity (as defined in Ecology's groundwater implementation guidance) for water. Wastewater application rates for other wastewater constituents must protect the groundwater quality.
- Apply water to the irrigated treatment site as approved in the permit.
- Operate the system to protect the existing and future beneficial uses of the groundwater and not unreasonably degrade groundwater quality.

B. Groundwater quality-based effluent limits

In order to protect existing water quality and preserve the designated beneficial uses of Washington's groundwater including the protection of human health, WAC 173-200-100 requires Ecology to condition discharge permits in such a manner as to authorize only activities that will not cause violations of the groundwater quality standards. The goal of the groundwater quality standards is to maintain the highest quality of the State's groundwater and to protect existing and future beneficial uses of the groundwater through the reduction or elimination of the discharge of contaminants to groundwater [WAC 173-200-010(4)]. Ecology achieves this goal by:

- Applying all known available and reasonable methods of prevention, control and treatment (AKART) to any discharge.
- Applying the antidegradation policy of the groundwater standards.
- Establishing numeric and narrative criteria for the protection of human health and the environment in the groundwater quality standards.

Ecology approved the engineering report as noted above in the technology based limits section. In addition, Ecology evaluated the report to ensure compliance with groundwater standards using the:

- *Guidance on Land Treatment of Nutrients in Wastewater, with Emphasis on Nitrogen*, Ecology, November 2004 [Guidance on Land Treatment of Nutrients in Wastewater](#)

Antidegradation policy

The state of Washington's ground water quality standards (GWQS) require preservation of existing and future beneficial uses of groundwater through the antidegradation policy, which includes the two concepts of antidegradation and non-degradation. Antidegradation is not the same as non-degradation (see below).

Antidegradation

Antidegradation applies to calculation of permit limits in groundwater when background (see below) contaminant concentrations are less than criteria in the GWQS. Ecology has discretion to allow the concentrations of contaminants at the point of compliance to exceed background concentrations but not exceed criteria in the GWQS. Ecology grants discretion through an approved AKART engineering analysis of treatment alternatives.

In this case, the existing groundwater concentrations beneath the EBuffer are currently above the groundwater criteria. The goal of land treatment is to reduce the concentrations of contaminants already in the groundwater to levels acceptable under MTCA and the future use of the site. These clean-up levels may be above background groundwater quality.

Non-degradation

Non-degradation applies to permit limits in groundwater when background contaminant concentrations exceed criteria in the GWQS. Non-degradation means that discharges to groundwater must not further degrade existing water quality. In this case, Ecology considers the background concentrations as the water quality criteria and may impose the criteria as permit limits. To meet the antidegradation policy, the facility must prepare an AKART engineering analysis that demonstrates that discharges to groundwater will not result in increasing background concentrations. The AKART engineering analysis will be reviewed and approved by Ecology.

You can obtain more information on antidegradation and non-degradation by referring to the Implementation Guidance for the Ground Water Quality Standards (Implementation Guidance), Ecology Publication #96-02 (available at [Implementation Guidance for the Ground Water Quality Standards](#)).

Background water quality

Background water quality is determined by a statistical calculation of contaminant concentrations without the impacts of the proposed activity. The calculation requires an adequate amount of groundwater quality data and determining the mean and standard deviation of the data, as described in the Implementation Guidance. Following the procedure in the Implementation Guidance, Ecology then defines background water quality for most contaminants as the 95 percent upper tolerance limit. This means that Ecology is 95 percent confident that 95 percent of future measurements will be less than the upper tolerance limit. There are a few exceptions to the use of the upper tolerance limit. For pH, Ecology will calculate both an upper and a lower tolerance limit resulting in an upper and lower bound to the background water quality. If dissolved oxygen is of interest, Ecology will calculate a lower tolerance limit without an upper tolerance limit.

Applicable groundwater criteria as defined in chapter 173-200 WAC and in the *Implementation Guidance for the Groundwater Quality Standards* (Ecology, 2005) for this discharge include those in the following table:

Table 3. Groundwater Quality Criteria

Parameter	Units	Groundwater Criteria	Maximum Reported Value	Percent of GWQS ^{a, b}
1,1-Dichloroethene ^c	µg/L	1	0.459	2
1,2-Dichloroethane	µg/L	0.5	0.0325 (0.257) ^d	6.5
Acrylonitrile	µg/L	0.07	0.5	71.4
Benzene	µg/L	1.0	0.934 (7.67)	93.4 ^e
cis-1,2-Dichloroethene ^f	µg/L	70 ^g	0.2	0.029
Ethylbenzene	µg/L	700 ^g	0.384 (4.49)	0.055
Ethylene Dibromide	µg/L	0.001	< 0.1 ^h	
Tetrachloroethene ⁱ	µg/L	0.8	< 0.2	< 25
Toluene	µg/L	1,000 ^g	0.2 (0.876)	0.02

Parameter	Units	Groundwater Criteria	Maximum Reported Value	Percent of GWQS ^{a, b}
trans-1,2-Dichloroethene ^j	µg/L	100 ^g	< 0.2	0.02
Trichloroethene ^k	µg/L	3	< 0.2	0.067
Vinyl Chloride	µg/L	0.02	0.111 (0.2)	555 ^e
m-Xylene	µg/L		2.48 (25.4)	
o-Xylene	µg/L		0.2 (3.37)	
Xylene (Total)	µg/L	10,000 ^g	2.68 (28.77)	0.027
pH	SU ^l	6.5 – 8.5	-- ^m	
^a	GWQS = Groundwater Quality Standard			
^b	Based on maximum reported value with statistical outliers removed.			
^c	Criteria is for 1,1-Dichloroethylene.			
^d	The maximum value with the statistical outliers removed is listed. The value in the parenthesis the maximum reported values, but are determined to be statistical outliers.			
^e	Bold values indicate the maximum concentration is near or above the groundwater quality standard. Average values are also greater than the standard.			
^f	Criterion is for cis-1,2-Dichloroethylene.			
^g	Values are Maximum Contaminant Levels for drinking water from WAC 246-290, as cited in the Implementation Guidance.			
^h	Method detection level of samples.			
ⁱ	Criterion is for Tetrachloroethylene.			
^j	Criterion is for trans-1,2-Dichloroethylene.			
^k	Criterion is for Trichloroethylene.			
^l	SU = Standard Units			
^m	No pH data currently available.			

Ecology has reviewed existing records for the facility's land treatment site and is unable to determine background groundwater quality. However Ecology records demonstrate known groundwater and soil contamination for the chemicals listed above.

Maximum reported concentrations of benzene and vinyl chloride in the proposed discharge exceed groundwater quality criteria. The proposed permit establishes early warning values (EWVs) based on current data. The permit depends on wastewater application limits and EWVs to ensure reduction of contaminants. Additional limits or monitoring can be imposed in the future if necessary.

Ecology established groundwater EWVs to protect the quality of the groundwater based on the current concentrations in the discharge and groundwater quality standards. The proposed groundwater EWVs establish the quality of the wastewater that GWI Holdings, Inc. / GACO Western may discharge from the approved infiltration area.

The table below includes the groundwater EWVs for the discharge. Two consecutive exceedances of an EWV for the same parameter at the same well means additional actions may be taken to determine the cause of the exceedance.

Table 4. Groundwater Quality-Based Early Warning Values

Parameter	Background Water Quality ^a	Groundwater Early Warning Value ^{b, c}
1,2-Dichloroethane	1 µg/L	0.48 µg/L
Benzene	90.4 µg/L	0.0795 µg/L
cis-1,2-Dichloroethene	2.48 µg/L	7 µg/L
Ethylbenzene	156 µg/L	70 µg/L
m-Xylene	543 µg/L	1,600 µg/L
o-Xylene	88.3 µg/L	1,600 µg/L
Vinyl Chloride	4.02 µg/L	0.029 µg/L
^a	Values are the maximum reported concentration from the PhAGR containments with statistical outliers removed.	
^b	Values are the most conservative values from the MTCA Concentration Level and Risk Calculation from the Groundwater Method A, Method B, and ARARs table .	
^c	Two consecutive exceedances of an EWV for the same parameter at the same well may lead to additional actions being taken.	
^d	µg/L = micrograms per liter.	
^e	Value is the 95 th percentile of the combined final data.	

Parameter	Daily Minimum	Daily Maximum
pH	5.5 standard units	8.5 standard units

Monitoring Requirements

Ecology requires monitoring, recording, and reporting (WAC 173-216-110) to verify that the treatment process functions correctly, the discharge meets groundwater criteria and that the discharge complies with the permit's effluent limits.

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects. When a facility uses an alternative method as allowed by the permit, it must report the test method, detection level (DL), and quantitation level (QL) on the discharge monitoring report or in the required report.

A. Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters).

B. Wastewater monitoring

Ecology details the proposed monitoring schedule under Special Condition S2.A. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

C. Groundwater monitoring

Ecology requires groundwater monitoring at the site in accordance with the Ground Water Quality Standards, chapter 173-200 WAC. This facility has three wells monitoring the land application area. Well MW-1 is the up gradient well and provides background groundwater concentrations. Wells MW-2 and MW 3 are down gradient and monitor groundwater for constituent concentrations potentially impacted by land application.

Ecology has determined through the MTCA process that groundwater at this site is contaminated with pollutants. This discharge is intended to reduce pollutant levels in the groundwater. Monitoring is required to verify the treatment system is reducing pollutant levels in the groundwater. Pumping the existing groundwater has a potential to move the pollutants in groundwater. Therefore, the facility must evaluate the impacts on groundwater quality. Ecology considers monitoring of the groundwater at the site boundaries and within the site an integral component of such an evaluation. Ecology details the proposed monitoring schedule under Special Condition S2.B.

D. Vadose zone monitoring

Ecology details the proposed monitoring schedule under Special Condition S2.C. Soil moisture content and matric potential will be measured to provide data on water movement in the soil both within and below to root zone.

Ecology will use this data to ensure wastewater does not move below the root zone faster than treatment by the trees can occur and to demonstrate compliance with the application rate limit in Special Condition S1.

E. Effluent limits which are near detection or quantitation levels

The water quality-based effluent concentration values that are near the limits of current analytical methods to detect or accurately quantify. The method detection level (MDL) also known as detection level (DL) is the minimum concentration of a pollutant that a laboratory can measure and report with a 99 percent confidence that its concentration is greater than zero (as determined by a specific laboratory method). The quantitation level (QL) is the level at which a laboratory can reliably report concentrations with a specified level of error. Estimated concentrations are the values between the DL and the QL. Ecology requires permitted facilities to report estimated concentrations. When reporting maximum daily effluent concentrations, Ecology requires the facility to report "less than X" where X is the required detection level if the measured effluent concentration falls below the detection level.

Other Permit Conditions

A. Reporting and record keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-216-110).

B. Operations and maintenance

Ecology requires dischargers to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state regulations (WAC 173-240-080 and WAC 173-216-110). The facility must prepare and submit an operation and maintenance (O&M) manual for the wastewater facility.

Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit and ensures the facility provides AKART to the waste stream.

C. Non-routine and unanticipated wastewater

Occasionally, this facility may generate wastewater that was not characterized in the permit application because it is not a routine discharge and was not anticipated at the time of application. These wastes typically consist of waters used to pressure-test storage tanks or fire water systems or of leaks from drinking water systems.

The permit authorizes the discharge of non-routine and unanticipated wastewater under certain conditions. The facility must characterize these wastewaters for pollutants and examine the opportunities for reuse. Depending on the nature and extent of pollutants in this wastewater and on any opportunities for reuse, Ecology may:

- Authorize the facility to discharge the wastewater.
- Require the facility to treat the wastewater.
- Require the facility to reuse the wastewater.

D. Industrial storm water discharge

In accordance with 40 CFR 122.26, the permit includes a requirement for the facility to apply for Ecology's Industrial Stormwater General Permit for authorization to discharge storm water that is exposed to industrial activities that require coverage under that permit, if applicable. The current use at the site does not require this coverage.

Most of the storm water generated at this site is discharged to ground and infiltrates. However, there is a potential for storm water from the land treatment area to enter surface water. The permittee must manage storm water by preventing exposure of sources of pollution, infiltrating storm water or a combination of both. Storm water has potential to enter the Green River if it reaches a catch basin.

GACO Western Inc. previously had coverage under Industrial Stormwater permit SO30000113D for SIC code 2851 (Paint and Allied Products). Coverage was terminated at the end of 2009. Ecology last inspected for this permit in 2006. The industrial operations that required this permit coverage ceased by 2010.

E. Best management practices – land treatment site

Best management practices (BMPs) are the actions identified to manage, prevent contamination of storm water/ groundwater. BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs also include treatment systems, operating procedures, and practices used to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage. The list below describes best management practices applicable for land treatment sites.

The Permittee must:

1. Not allow irrigation practices to result in runoff of wastewater to any surface waters of the state or to any land not owned by or under the control of the Permittee.
2. Use recognized good practices, and all available and reasonable procedures to control odors from the land application system.
3. Implement measures to reduce odors to a reasonable minimum when notified by Ecology.
4. Not apply wastewater to the irrigation lands in quantities that would:
 - a. Significantly reduce or destroy the long-term infiltration rate of the soil.
 - b. Cause long-term anaerobic conditions in the soil.
 - c. Cause ponding of wastewater and produce objectionable odors or support insects or vectors.
 - d. Cause leaching losses of constituents of concern beyond the treatment zone or in excess of the approved design. Constituents of concern are constituents in the wastewater, partial decomposition products, or soil constituents that would alter groundwater quality in amounts that would affect current and future beneficial uses.
5. Maintain all irrigation agreement(s) for lands not owned by the Permittee for the duration of the permit cycle. Any reduction in irrigation lands by termination of any irrigation agreement(s) may result in permit modification or revocation.
6. Immediately inform Ecology in writing of any proposed changes to existing irrigation agreements.
7. Meet the leaching requirement using precipitation and/or fresh water whenever leaching is required to control soil salinity.
8. Reduce wastewater application during the months of November to March to ensure plant uptake during the dormant season is not exceeded.

F. General conditions

Ecology bases the standardized general conditions on state law and regulations. They are included in all individual industrial state waste discharge permits issued by Ecology.

Permit Issuance Procedures

A. Permit modifications

Ecology may modify this permit to impose numerical limits, if necessary, to comply with water quality standards for groundwater, based on new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state regulations.

B. Proposed permit issuance

This proposed permit meets all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

References for Text and Appendices

Gavlak, R., D. Horneck, R.O. Miller, and J. Kotuby-Amacher.

3rd edition 2005. Soil, Plant And Water Reference Methods For The Western Region [Soil, Plant And Water Reference Methods For The Western Region](#)

GWI Holdings, Inc.

August 2018. Application for a State Waste Discharge Permit to Discharge Industrial Wastewater to Ground Water by Land Treatment or Application.

Washington State Department of Ecology.

1993. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Ecology Publication Number 93-36. 20 pp. [Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems](#)

Laws and Regulations ([Regulations-Permits](#))

Permit and Wastewater Related Information ([Water Quality Permits](#))

Revised October 2005. *Implementation Guidance for the Ground Water Quality Standards*, Ecology Publication Number 96-02. [Implementation Guidance for the Ground Water Quality Standards](#)

July 2018. *Permit Writer's Manual*, Publication Number 92-109 ([Permit Writer's Manual](#))

February 2007. *Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees*, Publication Number 07-10-024. [Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees](#)

November 2004. *Guidance on Land Treatment of Nutrients in Wastewater, with Emphasis on Nitrogen*, Ecology Publication #04-10-081; [Guidance on Land Treatment of Nutrients in Wastewater, with Emphasis on Nitrogen](#)

Appendix A--Public Involvement Information

Ecology proposes to issue a permit to GWI Holdings, Inc. / GACO Western. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Draft on February 9, 2021 in the Seattle Times to inform the public and to invite comment on the proposed draft State Waste Discharge permit and fact sheet.

The notice:

- Tells where copies of the draft Permit and Fact Sheet are available for public evaluation
(a local public library, the closest Regional or Field Office, posted on our website).
- Offers to provide the documents in an alternate format to accommodate special needs.
- Urges people to submit their comments, in writing, before the end of the Comment Period.
- Tells how to request a public hearing of comments about the proposed state waste discharge permit.
- Explains the next step(s) in the permitting process.

Ecology has published a document entitled Frequently Asked Questions about Effective Public Commenting, which is available on our website at [Frequently Asked Questions about Effective Public Commenting](#).

You may obtain further information from Ecology by telephone, 425-649-7201 (206-594-0000 after May 17, 2021), or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
PO Box 330316
Shoreline, WA 98133-9716

The primary author of this permit and fact sheet is Christopher Martin.

Appendix B--Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within thirty (30) days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2) (see glossary).

To appeal, you must do the following within thirty (30) days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW STE 301 Tumwater, WA 98501	Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

Appendix C--Glossary

AKART -- The acronym for “all known, available, and reasonable methods of prevention, control and treatment.” AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Alternate point of compliance -- An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site-specific basis following an AKART analysis. An “early warning value” must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).

Ambient water quality -- The existing environmental condition of the water in a receiving water body.

Average monthly discharge limit -- The average of the measured values obtained over a calendar months' time.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time up gradient of an activity that has not been affected by that activity [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically up gradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD₅ -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD₅ is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD₅ is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Clean water act (CWA) -- The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample -- A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction activity -- Clearing, grading, excavation, and any other activity, which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous monitoring -- Uninterrupted, unless otherwise noted in the permit.

Date of receipt -- This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Detection limit -- The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Early warning value -- The concentration of a pollutant set in accordance with WAC 173-200-070 that is a percentage of an enforcement limit. It may be established in the effluent, groundwater, surface water, the vadose zone or within the treatment process. This value acts as a trigger to detect and respond to increasing contaminant concentrations prior to the degradation of a beneficial use.

Enforcement limit -- The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Grab sample -- A single sample or measurement taken at a specific time or over as short a period as is feasible.

Groundwater -- Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Maximum daily discharge limit -- The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is the maximum discharge of a pollutant measured during a calendar day.

Method detection level (MDL) -- See Detection Limit.

National pollutant discharge elimination system (NPDES) -- The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH -- The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly down gradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) -- The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to $(1, 2, \text{ or } 5) \times 10^n$, where n is an integer (64 FR 30417).

ALSO GIVEN AS:

The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency, December 2007).

Reasonable potential -- A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer -- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sample Maximum -- No sample may exceed this value.

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

State waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater -- That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit -- A permit limit based on the ability of a treatment method to reduce the pollutant.

Total dissolved solids -- That portion of total solids in water or wastewater that passes through a specific filter.

Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D--Technical Calculations

Determination of Permit Limits

Ecology has specialized tools available to assist with the calculation of limits for inclusion in permits. Each tool uses a slightly different method of calculation to arrive at a unique limit value and each tool has certain strengths and weaknesses. Two of the methods available (PermitCalcDec2016V1.1_GW [PermitCalc] and TSDCalc11 for GW [TSDCalc]) use data for effluent, receiving water, and water quality criteria; while the third method (TSD for WQ Limits) is a direct calculation method using all available effluent or groundwater data. PermitCalc and TSDCalc were originally written for discharges to surface water, but have been modified to calculate groundwater limits. Modifications include adding parameters with groundwater quality standards to the list of available parameters and changing values for existing parameters from the surface water to the groundwater standard; changing the calculation of dilution factor from that used for a surface water mixing zone to one used for groundwater; removal of "acute" and "chronic" criteria and substitution with a single line for groundwater criteria; and changing units from micrograms per liter ($\mu\text{g/L}$) to milligrams per liter (mg/L). The strength of both PermitCalc and TSDCalc are that they use information from the receiving waters to arrive at a limit value. A weakness for both is that they assume a log-normal distribution for the data set.

The TSD for WQ Limits tool's strength lies in the fact that it uses all available data to calculate a limit and allows for the application of the any normality distribution. The weakness lies with the fact that the limit value calculated from effluent values reflects only current wastewater treatment, and may not be protective of groundwater. This is due to using only effluent data in the calculations, thus there is no opportunity to add a dilution factor or perform a comparison to ambient groundwater conditions.

Because of the different strengths and weaknesses of the tools, both PermitCalc and TSDCalc are used to determine which constituents show a reasonable potential to exceed groundwater limits. TSD for WQ Limits is used to calculate limits and early warning values for groundwater. Groundwater limits and early warning values are normally calculated using receiving water data. However in this case, background groundwater data is from well MW-9. Initially data for discharge from the pilot project PhAGRs was going to be used to calculate early warning values. But, due to concerns with representativeness and data variability it was determined that risk based levels established under the Model Toxics Control Act (MTCA) are more appropriate for this initial permit cycle.

Before any calculations are conducted, the entire data set is subjected to basic descriptive statistical analyses. Because there have been only a limited number of sampling events during the pilot project results from have been combined as shown in Table D-5.

Table D-5. MW-9 sample events

Containment No.	PhAGR No.	Number of Samples	Description
MW-9	MW-9	5	Groundwater monitoring well.
	T-2	7	Groundwater holding tank.

Each parameter is first evaluated for statistical outliers, seasonality, normality, and equality of variance. Basic descriptive statistics (mean [average], minimum, maximum, median, standard

deviation, variance, and 95th percentile) are calculated for the data set both with and without outliers removed. The PermitCalc worksheet also requires calculation of the geometric mean, and 50th and 90th percentiles. All statistics are done using the Sanitas statistical software program by Sanitas Technologies, and the methods detailed in the EPA 530/R-09-007, [Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance](#), March 2009 (Unified Guidance).

Outliers are determined by the method set out in EPA G-89-00018, *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities Interim Final Guidance*, April, 1989. Outlier normality is tested using the Shapiro-Francia method (Shapiro-Wilk if $n \leq 10$) with an alpha of 0.1. Seasonality is tested using the Kruskal-Wallis test and the default of four seasons. If the calculated Kruskal-Wallis statistic is greater than the tabulated Chi-squared value, then seasonality is confirmed. If a parameter is determined to have seasonality, the software program automatically deseasonalizes before conducting any analysis. Normality of the data set is tested using the Ladder of Powers again at an alpha of 0.1. The Ladder of Powers allows for testing of multiple statistical distributions at one time. Statistical distributions include normal, log-normal, square-root normal, cube-root normal, square normal, cube normal, x^4 normal, x^5 normal, and x^6 normal. Equality of variance is tested using Levene's Equality of Variance method.

Seasonality is not found in any of the data due to insufficient seasonal data (data spans only six months, July to December).

The data set was tested for 15 parameters; 1,1,2,2-tetrachloroethane, 1,1-dichloroethene, 1,2-dichloroethene, acrylonitrile, benzene, cis-1,2-dichloroethene, ethylbenzene, ethylene dibromide, m-xylene, o-xylene, tetrachloroethene, toluene, trans-1,2-dichloroethene, trichloroethene, and vinyl chloride. Of these only seven (1,2-dichloroethene, benzene, ethylbenzene, m-xylene, o-xylene, toluene, and vinyl chloride) had sufficient detections above the reporting limit to allow meaningful statistical analysis.

Outliers are determined for each of the seven parameters. Outliers are determined for MW-9 for ethylbenzene, o-xylene, toluene, and vinyl chloride.

Through the Ladder of Powers normality testing all parameters were identified as non-normal in the final combined data set. Table D-6 presents to the statistics for the source water. Table D-7 shows the Method B cancer risk values for groundwater concentrations for the various constituents. These values are from Ecology's Clean-up Levels and Risk Calculation (CLARC)

Table D-6. Descriptive Statistics for MW-9 (Source Groundwater)

Parameter		Count	Average ^A	Minimum	Maximum	Median	Geomean	Std Dev ^B	Variance	CV ^C	Percentile		
											50 th	90 th	95 th
1,1,2,2-Tetrachloroethane		12	0.6567	0.02	2	0.2	0.1888	0.8521	0.7261	1.298	0.2	2	2
1,1-Dichloroethene		12	0.6949	0.02	2	0.2	0.2460	0.8310	0.6905	1.196	0.2	2	2
1,2-Dichloroethane		12	0.7338	0.0182	2.53	0.2	0.2116	0.9871	0.9744	1.35	0.2	2.33	2.44
Acrylonitrile		12	2.29	0.05	10	1	0.9948	2.98	8.86	1.299	1	5	7.25
Benzene		13	42.71	6.9	90.4	43	34.52	24.08	579.81	0.5638	43	73.4	83.2
cis-1,2-Dichloroethene		12	0.7297	0.0759	2	0.2045	0.3981	0.8042	0.6468	1.102	0.2045	2	2
Ethylbenzene ^D		12	17.04	24.9	4.23	18.3	15.61	6.17	38.102	0.3621	18.3	23.55	24.24
Ethylene Dibromide		12	0.445	0.01	2	0.2	0.1260	0.6056	0.3667	1.36	0.2	1	1.45
m-Xylene		13	103.72	23.1	166	105	89.11	47.33	2,239.95	0.4563	105	156	160
o-Xylene ^E		12	14.44	24.4	1.12	15.7	11.91	6.49	42.18	0.4498	15.7	20.6	22.42
Tetrachloroethene		12	0.6567	0.02	2	0.2	0.1888	0.8521	0.7261	1.298	0.2	2	2
Toluene ^F		12	8.47	13.2	0.0702	9.755	5.19	4.504	20.28	0.5318	9.76	12.97	13.09
trans-1,2-Dichloroethene		12	0.6552	0.0104	2	0.2	0.1718	0.8533	0.7281	1.302	0.2	2	2
Trichloroethene		12	0.6567	0.02	2	0.2	0.1888	0.8521	0.7261	1.298	0.2	2	2
Vinyl Chloride ^G		12	0.874083	2	0.02	0.719	0.516708	0.744635	0.5544814	0.8519	0.719	2	2
^A	All values are in micrograms per liter (µg/L).												
^B	Std Dev ≡ Standard Deviation.												
^C	CV ≡ Coefficient of Variation.												
^D	One statistical outlier identified from the Ethylbenzene data set; 4.23 on 07/27/2018.												
^E	One statistical outlier identified from the o-Xylene data set; 1.12 on 07/27/2018.												
^F	Three statistical outliers identified from the Toluene data set; 0.0702 on 07/27/2018, < 10 on 07/04/2018, and 0.736 on 07/27/2018.												
^G	One statistical outlier identified from the Vinyl Chloride data set; < 0.02 on 07/27/2018.												

Table D-7. Most Conservative Risk Values

Parameter	CLARC Values ^A	Units	Source
1,1-Dichloroethene	7.00	Micrograms per liter (µg/L)	Method B ^B
1,2-Dichloroethane	0.48	µg/L	Method B
Acrylonitrile	0.0801	µg/L	Method B
Benzene	0.8	µg/L	Method B
cis-1,2-Dichloroethene	16	µg/L	MCL ^C
Ethylbenzene	700	µg/L	MCL
Ethylene Dibromide	0.022	µg/L	Method B
m-Xylene	1,600	µg/L	Method B NC ^D
o-Xylene	1,600	µg/L	Method B NC
Total Xylenes	1,000	µg/L	Method B NC
Tetrachloroethene	21	µg/L	Method B
Toluene	640	µg/L	Method B NC
trans-1,2-Dichloroethene	100	µg/L	MCL
Trichloroethene	0.54	µg/L	Method B
Vinyl Chloride	0.029	µg/L	Method B
^A	Cleanup Levels and Risk Calculations (CLARC)		
^B	Method B Cancer risk.		
^C	MCL = Maximum Contaminant Level from 40 Code of Federal Regulations (CFR) 141		
^D	Method B Non-Cancer risk.		

Appendix E--Response to Comments

Comment received via email from Mr. Doug Lyons.

I would hope you all will provide the widest latitude possible in granting this permit. As I have said many time before, and even with more emphasis now with the effects of the Covid virus on our economy, we need companies like this to be successful, generate jobs, and continue to contribute to the tax base.

Response: Ecology makes every effort to balance economic impacts of permit conditions with protection of human health and the environment.

Comments provided by Mr. Brad Helland.

Comments on State Waste Discharge Permit Number ST0501318

1. Condition S1.A, paragraph 2 specifies, "...drip irrigation not to exceed the hydraulic loading rate for water, and at rates for any other wastewater constituents to protect background groundwater quality."

Upon consulting with Ecology, the intended loading rate should be "not to exceed the field capacity for water" to avoid runoff and excessive percolation to the surficial aquifer.

Also, wastewater constituents should be limited to concentrations that protect groundwater quality pursuant to criteria specified elsewhere in the permit, rather than "background" concentrations (which are undetectable up gradient of the Ebuffer treatment system with a standard low-level VOC method, SW-846 8260D-SIM). As written, any detection of any constituent (even at concentrations orders of magnitude below water quality standards) would effectively shut down the remediation project without presenting any significant risk to potential receptors or degradation in groundwater quality. The word "background" should be struck.

Response: Accepted. Revised to clarify that hydraulic loading rate equals field capacity. Removed "background" from the sentence.

Accepted. Revised early warning values from PhAGR results to CLARC values. Revision made due to concerns of representativeness and variability with the PhAGR data.

2. Condition S1.A, Table 1 has an effluent limit minimum pH of 6.5.
 - a. Groundwater data collected in 2020 and 2021 for MW-9, the source of irrigation water, showed pH measurements ranging from 5.43 to 6.65.
 - b. This range appears to be typical of unimpacted groundwater for the area, based on data for MW-1 (up gradient background well), MW-2 (EBuffer well), and MW-3 (down gradient well between the EBuffer and Green

River), which ranged over the same period from 5.25 to 6.34, 6.12 to 6.67, and 6.01 to 6.42, respectively.

- c. In addition, regional water quality studies prepared by USGS for East King County (USGS 1995) and Western Snohomish County (USGS 1997) showed pH ranges in groundwater from 5.6 to 9.5 (n = 123) and 5.6 to 9.6 (n = 297), respectively. These USGS reports were the only readily available online resources describing regional groundwater pH.

Site and regional groundwater data suggest the effluent limit minimum pH be set at or below 5.25, which is the lowest value for the up gradient groundwater monitoring well (reflecting background conditions). This also applies to the Fact Sheet, Table 4.

Response: Disagree with setting lower pH limit at lowest measured value to date. Did adjust the lower pH limit to 5.5 standard units to capture natural values below 6.5.

3. Condition S1.B, Table 2 lists "Daily Maximum" values for MW-2 and MW-3, but the frequency of monitoring in Condition S2.A, Table 3 is "Monthly / Quarterly" so a daily maximum cannot be measured. Suggest deleting "Daily" so that the early warning level is effective regardless of monitoring frequency.

Response: Accepted. Deleted "Daily" from the table heading. Clarified in footnote what "Maximum" value means.

4. Condition S2.A, paragraph 1 specifies the sampling point "at the irrigation headwork's pump station." Because the pump pressurizing the irrigation system is located inside the warehouse at the facility, the more representative sampling point is at the irrigation system "splitter box," which supplies the drip irrigation lines in the EBuffer remediation system.

Response: Accepted. Revised text to indicate "splitter box." After discussion with the Permittee this is the proper terminology for what was initially referred to as the "headworks pump station."

5. Condition S2.A, Table 3 specifies analytes for irrigation wastewater monitoring, and Condition S2.B, Table 4 specifies analytes for groundwater monitoring. These tables should be identical to the proposed analyses in Appendix A, as revised (see comment 9).

Response: Accepted. Corrected tables.

6. Condition S2.B, Table 4 specifies groundwater monitoring frequency as Monthly / Quarterly for several parameters. Because irrigation will be halted from November through March, permittee requests monitoring frequency during this period to be quarterly. This would reduce the number of measurements during non-irrigation periods but still provide adequate data about groundwater conditions.

Response: Accepted. Revised text to clarify that, instead of monthly monitoring, two quarterly samples (Nov-Dec and Jan-Mar) are required during the non-operational time. If wastewater is applied at any time during this period then a monthly sample is necessary.

7. Condition S2.C, Table 5 specifies soil moisture content measurement by Standard Method 2540B. Because the sampling point for vadose zone monitoring is below the root zone of the Ebuffer, physically collecting soil samples for analysis is not feasible. Permittee has been successfully monitoring soil moisture continuously with electronic probes and proposes continuing with this method. Suggest striking "Method is SM 2540B (Soils)."

Response: Accepted. Removed reference to method.

8. Condition S2.F, paragraph 2, specifies "Crops and soils data are process control parameters, which do not require preparation by an accredited laboratory. However, the Permittee must obtain this data from a reputable agricultural test lab that is an active participant in a nationally recognized agricultural laboratory proficiency testing program." Because no crop or soil data, other than soil moisture which is addressed elsewhere in the permit, are required, this paragraph should be struck.

Response: Did not change. Left in as standard language in the event that crop/soil sampling becomes necessary.

9. Appendix A specifies analytical protocols for groundwater parameters, metals, and priority pollutants. To reflect current field measurement procedures, focus on analytes that are significant at the site, and provide lower reporting and detection limits for organic pollutants, the permittee proposes the following modifications (in RLSO format):

Response: Accepted changes as noted below. Converted values to micrograms per liter (µg/L).

POLLUTANT	Recommended Analytical Protocol	Detection (DL) ¹ µg/L unless specified	Quantitation Level (QL) ² µg/L unless specified
Alkalinity, Total	SM2320-B ³		5 mg/L ⁴ as CaCO ₃
BTEX (benzene +toluene + ethylbenzene + m,o,p xylenes)	EPA SW 846 ⁵ 8021/8260D-SIM	60 ng/L	400 ng/L
Chloride	SM4500-CI B/C/D/E and SM4110 B		Sample and limit dependent
Dissolved oxygen	Calibrated device		0.2 mg/L

POLLUTANT	Recommended Analytical Protocol	Detection (DL) ¹ µg/L unless specified	Quantitation Level (QL) ² µg/L unless specified
Flow	Calibrated device		
Hardness, Total	SM2340B		200 as CaCO ₃
Nitrate + Nitrite Nitrogen (as N)	SM4500-NO ₃ -E/F/H		100
ORP	Calibrated device		
Sulfate (as mg/L SO ₄)	SM4110-B		0.2 mg/L
Temperature (max. 7-day avg.)	Analog recorder or use micro-recording devices known as thermistors		0.2° C
Turbidity	Calibrated device		

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL) ¹ µg/L unless specified	Quantitation Level (QL) ² µg/L unless specified
VOLATILE COMPOUNDS					
Acrylonitrile	3	107-13-1	EPA SW 846 ⁵ 8021/8260D-SIM	16 ng/L	50 ng/L
Benzene	4	71-43-2	EPA SW 846 ⁵ 8021/8260D-SIM	5.5 ng/L	20 ng/L
1,2-Dichloroethane	10	107-06-2	EPA SW 846 ⁵ 8021/8260D-SIM	3.0 ng/L	20 ng/L
1,1-Dichloroethene		75-35-4	EPA SW 846 ⁵ 8021/8260D-SIM	5.0 ng/L	20 ng/L
1,2-trans-Dichloroethene		156-60-5	EPA SW 846 ⁵ 8021/8260D-SIM	5.5 ng/L	20 ng/L
Ethylbenzene	38	100-41-4	EPA SW 846 ⁵ 8021/8260D-SIM	40 ng/L	200 ng/L

PRIORITY POLLUTANTS	PP #	CAS Number (if available)	Recommended Analytical Protocol	Detection (DL) ¹ µg/L unless specified	Quantitation Level (QL) ² µg/L unless specified
VOLATILE COMPOUNDS					
Toluene	86	108-88-3	EPA SW 846 ⁵ 8021/8260D-SIM	40 ng/L	200 ng/L
Vinyl chloride	88	75-01-4	EPA SW 846 ⁵ 8021/8260D-SIM	5.5 ng/L	20 ng/L
Xylene (Total) ⁷		⁸	EPA SW 846 ⁵ 8021/8260D-SIM	55 ng/L	200 ng/L

Comments on Fact Sheet for State Waste Discharge Permit Number ST0501318

1. The Summary describes PhAGRs in “closed” vessels, but it is more accurate to describe them as “containment” vessels. Please revise the second sentence to read, “Based on previous results from pilot testing Phytoremediation Attached Growth Reactors (PhAGRs – selected trees placed in various containment vessels... .”

The Summary also specifies “patent pending” but US patents have been obtained since the original permit application. Please insert the following: United States patents #5,947,041 and #6,250,237. This also applies to Section II, Background Information, Table 1 and subsection A, Facility description.

Response: Accepted as noted.

2. Section II.A, Land treatment and distribution system, 3rd paragraph, specifies that “any discharge not used by the trees during this period will be held in the soil column,” but the EBuffer system is designed to treat water in the root zone of the soil column and allow percolation of that treated water into the surficial aquifer. Please add “and percolated into the surficial aquifer” to the end of the sentence.

Response: Accepted as noted.

3. Section III.A, Land treatment requirements, specifies agronomic rates for water. Please revise the first bullet to read “field capacity for water.”

Response: Accepted as noted.

4. Section III.B, Antidegradation, 2nd paragraph, states, “the existing groundwater concentrations are currently above the groundwater criteria.” For clarity and to underscore the uncontaminated conditions in the EBuffer, please revise this

sentence to read, “the existing groundwater concentrations beneath the facility are currently above the groundwater criteria.”

5. Response: Accepted as noted. Section III.B, Table 4. See above comment on Condition S1.A, Table 1 regarding background pH measurements.

Response: Accepted as noted.

6. Section IV.D, Vadose zone monitoring should be revised for clarity and accuracy. Please revise the second sentence to read, “Ecology will use this data to ensure irrigated wastewater pollutants do not move below the root zone in significant concentrations and to demonstrate compliance with the hydraulic loading rate limit in Special Condition S1.”

Response: Accepted. Revised text.

7. Appendix D shows calculations for permit limits and early warning values. There are more recent and more representative data available that generally show lower concentrations of pollutants, but the permit limits and warning values are acceptable and minor changes to them do not warrant the level of effort that would be required at this time.

Response: No changes made in order to expedite issuance of permit. New values will be evaluated at the end of this permit cycle.

Comments on SEPA DNS determination for State Waste Discharge Permit Number ST0501318

1. Section C of the checklist is missing the submission date, which is referenced elsewhere in the document as 17 November 2020.

Response: Accepted as noted.

Fact Sheet for State Permit No. ST0501318
GWI Holdings, Inc./GACO Western
Permit Effective Date: June 1, 2021
Page 36 of 36

References

USGS. (1995). Geohydrology and Ground-Water Quality of East King County, Washington. Water-Resources Investigations Report 94-4082.

USGS. (1997). The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington. Water-Resources Investigations Report 96-4312.